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BARNES & THORNBURG LLP
11 SOUTH MERIDIAN
INDIANAPOLIS, IN 46204

EXAMINER	
CHAMPAGNE, DONALD	
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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 09618615

Filing Date: 18 July 2000

Appellant(s): Gary W. SINDE

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Richard D. Conard, Esq., For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 6 May 2008 appealing from the Office action mailed 9 November 2007.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings that will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims is correct.

(4) Status of Amendments

The appellant's statement of the status of amendments is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

The following is a listing of the evidence (e.g., patents, publications, Official Notice, and admitted prior art) relied upon in the rejection of claims under appeal.

US005251626A	Nickolls et al.	10-1993
US006516309B1	Eberhart et al.	02-2003

MedicineNet.com webpage downloaded 15 October 2004

Tortora, Gerald J. et al., "Principles of Anatomy and Physiology", 7th ed. (1993): 601-603.

Martini, Frederic, et al., "Fundamentals of Anatomy and Physiology", 7th ed. (2006): 684-687.

Declaration of Donald L. Champagne, P.E., Ph.D., mailed with an Office action on 9 November 2007.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims. This is the final rejection mailed 9 November 2007. A typographical error in each the footnote 1 citation and in the MPEP reference in para. 11 have been corrected. A declaration mailed with the Office action follows immediately below.

Prosecution Reopened

1. In view of the appeal brief filed on 23 July 2007, PROSECUTION IS HEREBY REOPENED. A new ground of rejection is set forth below.

2. To avoid abandonment of the application, appellant must exercise one of the following two options:

   (1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

   (2) initiate a new appeal by filing a notice of appeal under 37 CFR 41.31 followed by an appeal brief under 37 CFR 41.37.

   The previously paid notice of appeal fee and appeal brief fee can be applied to the new appeal. If, however, the appeal fees set forth in 37 CFR 41.20 have been increased since they were previously paid, then appellant must pay the difference between the increased fees and the amount previously paid.

3. A Supervisory Patent Examiner (SPE) has approved of reopening prosecution by signing at the end of this Office action.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

   > (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1-4, 6-9, 11-14, 16-19, 21-24, 26-29, 31-34 and 36-39 are rejected under 35 U.S.C. 103(a) as being obvious over Nickolls et al. (US005251626A).

6. Nickolls et al. teaches (independent claims 1 and 21) a method and apparatus for identifying arrhythmias (abnormal heart rhythms) by monitoring physiological signals (col. 6 lines 5-14) descriptive of heart activity (col. 9 lines 47-48), which reads on identifying a source of abnormality within an electrical network, including classifying electrocardiogram (ECG) waveforms (col. 5 lines 48-54), which reads on storing frequency spectra of known arrhythmias/abnormalities (col. 7 lines 3-8 and Figs. 7-9), comparing the input ECG spectra with the spectra of known arrhythmias/abnormalities, and determining from the comparison which of the frequency spectra of known arrhythmias is closest to the input ECG spectra (col. 11 lines 28-38 and Figs. 4 and 5, described at col. 12 line 11 to col. 13 line 65).[1]

7. Nickolls et al. does not teach that the abnormality is an ingress into (external to) a network. However, for the following reasons, it would have been obvious to one of ordinary skill in the art, at the time of the invention, to apply the teachings of Nicholls et al. to identifying an abnormality that is an ingress into a network.

8. First, the problems of the instant and reference inventions are analogous. Both inventions comprise storing frequency spectra of known sources of ingress/abnormality, comparing the frequency spectrum of the unknown ingress/abnormality signal to the frequency spectra of known sources of ingress/abnormality, and determining from the comparison which of the frequency spectra of known sources of ingress/abnormality is closest to the frequency spectrum of the unknown ingress/abnormality. The two inventions differ only in that the instant invention identifies an ingress/abnormality that is eternal to a network while the reference invention identifies an arrhythmia/abnormality that is internal to the heart network. The two inventions are concerned with identifying unknown spectra and do so in the same way, by comparison to known spectra.

[1] MedicineNet.com defines "QRS complex". The heart contains its own network, called the *conduction system* (Tortora et al.) or the *conducting system* (Martini et al.).

9. Second, one of ordinary skill in the art is a graduate engineer familiar with the use of spectral analyzers and related instruments. Such a person is skilled in applying mathematical analogies to diverse problems as well as in analyzing spectra. The application of Nicholls et al. to the instant problem of identifying an unknown spectrum and therefore its source outside of a network is well within the skill of an ordinary practitioner of the engineering art.

10. A declaration is being filed herewith attesting that the examiner has himself applied these principles to identify a source of ingress into a gas turbine power plant. Note from the declaration that no meaningful distinction was made between (ingress) sources external to the power plant and sources internal to the power plant. Either external (ingress) or internal sources could have caused the problem. The team of which the examiner was a member investigated both external (ingress) and internal sources simultaneously. One of ordinary skill in the art would not regard the distinction between external (ingress) and internal sources as meaningful. The fact that the reference invention identifies internal spectra would not have dissuaded one of ordinary skill in the art from applying the reference invention to the identification of external (ingress) spectra.

11. The courts have held that a reference may be used to reject a claim if the reference is "reasonably pertinent to the particular problem with which the inventor was concerned" (MPEP § 2141.01(a)). Here Nicholls et al. is applicable because the particular problem is the same, identification of an unknown spectrum.

12. The US Supreme Court has ruled,

> "When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill can implement a predictable variation, §103 likely bars its patentability. For the same reason, if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill." (*KSR International Co. v. Teleflex, Inc.*, 550 U.S. ___, 82 USPQ2d 1385 (2007)

The reference invention compares an unknown spectrum within the human heart to known spectra so as to identify the unknown spectrum. While the instant invention is not in the same field, it is a predictable variant of the reference invention, and therefore, under *KSR*, barred from patentability by 35 USC § 103. Using the technique of the reference invention is further obvious because comparing an unknown spectrum to known spectra so as to identify the unknown spectrum is not beyond the skill of an ordinary practitioner of engineering.

13. Nickolls et al. also teaches (claims 2-4, 6-9, 11-14, 16-19, 22-24, 26-29, 31-34 and 36-39) analog, digital and hybrid analog-digital networks (col. 6 lines 22-23 and col. 11 lines 3-4) and optimization by use of a back propagation neural network (col. 5 lines 48-49).

14. Claims 5, 10, 15, 20, 25, 30, 35 and 40 are rejected under 35 U.S.C. 103(a) as being obvious over Nickolls et al. in view of Eberhart et al. (US006516309B1). Nickolls et al. does not teach a particle swarm optimizer. Eberhart et al. teaches a particle swarm optimizer (PSO, Abstract and col. 2 line 47 to col. 3 line 10). Because Eberhart et al. teaches that PSO can improve the efficiency of diagnostic neural networks (col. 1 line 64 to col. 2 line 7)[2], it would have been obvious to one of ordinary skill in the art, at the time of the invention, to add the teachings of Eberhart et al. to those of Nickolls et al.

Declaration of Donald L. Champagne, P.E., Ph.D.

1. I am a graduate engineer. I was awarded a B.S. degree in mechanical engineering from the University of Rhode Island (Kingston, RI) in 1966. I was awarded an M.S. degree in chemical engineering from Rensselaer Polytechnic Institute (Troy, NY) in 1978. I have been registered as a Professional Engineer in the State of Ohio since 1972 (License no. PE 36367). I currently reside at 9802 Forest Grove Drive, Silver Spring MD 20902-5706. I am currently employed as a Primary patent Examiner by the US Patent and Trademark Office in Alexandria VA.

2. From 1973 to 1980 I was employed in a number of capacities by the Gas Turbine Products Division of General Electric Company in Schenectady NY. During 1973 to 1976 my position was Combustion Development Engineer for the company's heavy-duty

[2] As explained below in the Response to Argument (p. xx), the citation should have been to col. 1 line 62 to col. 2 line 28.

large gas turbine power plant product. During this period my primary assignment was with a task force working to solve a combustion-driven oscillation problem with the new MS 7001B packaged power plant product.

3. Any flexible body, which includes most things made of metal as well as fluids, can vibrate. When stimulated, any such body preferentially vibrates at some certain "natural frequency" that is governed by properties of the body. This is the principal upon which musical instruments operate. String instruments produce sounds of various pitch or frequency by varying string length. Wind instruments vibrate a body of air, and the pitch or frequency is changed by varying the geometry of this body of air (e.g., by moving the slide of a trombone).

4. In 1973 our combustion-driven oscillation task force focused initially on a power plant installed at McPherson, Kansas. That plant had been forced out of service after only a few hours of operation by the failure of sheet metal parts in the combustion system. Field examination of the parts suggested fatigue failure, which is due to oscillatory forces. Combustion "noise" was known to have caused fatigue failures in rockets and aircraft gas turbine engines, so a similar cause was suspected in the McPherson machine. It was our job to identify the source of this suspected combustion-driven oscillation.

5. We did so by first instrumenting the repaired McPherson gas turbine power plant with means, essentially special microphone probes, to measure gas-phase oscillation. The field instrumentation also included means to electronically record whatever was detected by the oscillation probes and means to analyze the oscillation data into a frequency spectrum (a plot of amplitude versus frequency). The frequency spectra of the gas turbine in operation quickly revealed a high-amplitude (6 psi peak-to-peak) component at a frequency of 86 Hz. It then became our job to identify the source of this oscillation at 86 Hz.

6. We considered both internal sources as well as external sources (ingress sources) by gathering spectra of known sources of oscillation. In some cases these sources were known from physical theory. For example, some engineers calculated the natural frequencies of various fluid and solid bodies within the combustion system. Other engineers gathered spectra of external sources. For example, I personally visited the

gas fuel supplier to learn if their compressors or other components upstream of the McPherson power plant were capable of generating a significant oscillation at or near 86 Hz.

7. By this process of comparison and elimination, it was ultimately determined that the source of the damaging 86 Hz oscillation was the gas body within the main cylindrical combustion chamber itself. Its theoretical natural frequency was near 86 Hz, and its spectrum shifted with operating conditions (due to changes in the mean temperature of the gas body) as predicted by theory. The problem was ultimately solved by making changes within the combustion chamber to reduce the magnitude of the oscillation and by reinforcing the downstream component that had been failing.

/Donald L. Champagne/

Donald L. Champagne

5 November 2007

(10) Response to Argument

I. First ground of rejection: claims 1-4, 6-9, 11-14, 16-19, 21-24, 26-29, 31-34 and 36-39 rejected under 35 U.S.C. 103(a) as being obvious over Nickolls et al.

A. Nickolls and the Champagne Declaration are Non-Analogous

A reference must be analogous prior art if it is to be relied upon for a rejection under 35 USC 103 (MPEP § 2141.01(a)I.). Appellant argues (p. 17-21), that Nickolls and the Champagne declaration are non-analogous prior art.

A reference can be analogous in two ways: either (1) the reference need be in the same field as the appellant's endeavor, or (2) the reference needs to be reasonably pertinent to the claimed invention. A reference in a field different from that of applicant's endeavor may be reasonably pertinent if it is one which, because of the matter with which it deals, logically would have commended itself to an inventor's attention in considering his or her invention as a whole. (MPEP § 2141.01(a)I. or appellant's quotation (brief p. 17) from *In re Clay*.)

The matter to which appellant's endeavor deals is: identifying the source of a signal by comparing its spectrum to the spectra of known sources. In its simplest form (independent claim 1 and 21), that's it. Again in its simplest form, Nickolls does exactly the same thing

(para. 6 and 8 of the rejection). Furthermore, the examiner has made of record a declaration (reproduced above and discussed below) attesting that he and other members of a General Electric Company team practiced this same basic invention more than 30 years ago. Nickolls is analogous and the subject 103(a) rejection is valid because Nickolls is very pertinent to the particular problem with which the instant inventor is concerned.

The appellant (p. 17-21) argues only that the reference is not in the same field as the instant invention. The rejection does not dispute that. Rather, the rejection is based on the pertinence of Nickolls to the problem with which the instant inventor is concerned. The instant invention identifies the source of a signal by comparing its spectrum to the spectra of known sources. That is exactly what Nickolls does (para. 6 and 8 of the rejection).

B. "Ingress" does not Equal "Abnormality"

The appellant and the examiner devoted much time during prosecution to arguing the "ingress" limitation of the claims (e.g., at claim 1 line 1) and the rejection does indicate that the sources to be identified in both the instant and reference inventions are "abnormalities".[3] It does not matter. What matters is that both the reference and instant inventions identify the source of a signal by comparing its spectrum to the spectra of known sources. The unknown source could be a horrible screech or Bruce Springsteen at his best. It does not matter. Either could be identified by comparing the spectrum of the unknown to the spectra of known sources. That is what the reference invention does, and that is what the instant invention does. The subject 103(a) rejection is valid because the reference is very pertinent to the particular problem with which the instant inventor is concerned.

The examiner provided his declaration to illustrate this point. The appellant is entitled to limit the invention to identifying the source of a signal from outside the system (a source of ingress), but the GE team referred to in the declaration used the same method, in the early 1970's, to consider a variety of disturbance sources both inside and outside of the subject (gas turbine combustion) system: measure the spectrum of the unknown source, and compare it to the spectra of known sources. It does not matter whether the unknown signal is good or bad, or whether its origin is external or internal.

[3] The appellant (bottom of p. 21) is not quoting the current rejection. Presumably his argument is based on a previous rejection. The disclosed purpose of the instant invention is "identification of sources of ingress noise" in cable TV systems (spec. p. 1 lines 9-13).

C. There is No Ordinary Practitioner of the Engineering Art

Except in Lake Wobegon, where all the children are above average and presumably all would mature to be above average practitioners of their professions, there has to be one of ordinary skill in every art. The instant and reference inventions deal with the science of diagnostic analysis. If the appellant is implying that this science transcends simple disciplinary boundaries, the appellant would be correct. As illustrated immediately below, engineers tend to learn this discipline through practice, and well understand its basic principles when they achieve the 10-20 years of experience that characterize one of ordinary skill in most engineering arts. Such an engineer in any discipline would readily understand from Nickolls that an unknown source could be identified by comparing its spectrum to the spectra of known sources. That is why Nickolls suggests the instant invention.

D. If There Is An "Ordinary Practitioner of the Engineering Art," The Examiner Is Not One

During the period of the declaration (1973-76), I was typical of GE staff of similar age and not very different from my peers in most engineering disciplines and industries.[4] None of we four who constituted the original “Transition Piece Task Force” initially had any experience with the essential problem, combustion driven oscillation. We learned as others do, from the published prior art, while receiving some guidance from our GE colleagues in the aircraft gas turbine business, where such problems were well known. We used off-the-shelf diagnostic equipment.

E. Mistaken Premises of, and Mistaken Conclusions from, the Champagne Declaration

Much of the argument herein has been addressed above. Appellant’s learned counsel does question (bottom of p. 23) how the “noise ingress” could be detected “over the noise generated by the gas turbine itself”. The word “noise” is used by the examiner/declarant as it is used in the appellant’s disclosure (p. 1 lines 9) to mean an undesirable signal. The declaration states that the problematic “noise” was generated within the gas turbine combustion system (where the pressure was in the order of 10 atmospheres) and found to

[4] I worked part-time, continually towards the M.S. degree in engineering from September 1973. By late 1976 I had completed about two-thirds of my program of study. I received the M.S. degree in December 1978. I earned the Ph.D. degree, in economics and statistics, through study from 1979 to 1986.

be a 6 psi oscillation at 86 Hz. That is a "noise" of 186 dbA and is accordingly readily detectable by appropriate probes ("special microphones" capable of sensing large displacements in the high-temperature gas within the machine). Incidentally, a completed packaged power plant of the kind described in the declaration, under normal operation, is quite quiet to a human observer standing near the machine.

The appellant also argues (bottom of p. 24), "none of the activities that the Champagne declaration alleges took place has been demonstrated or even alleged to even be prior art." The examiner/appellant has attested that all of the declaration activities took place in or before 1976. The declaration did fail to expressly note, as the examiner has now done above, that the GE task force used off-the-shelf diagnostic equipment and otherwise relied on publicly-known art. Nothing attested to here or in the declaration was a GE trade secret. The examiner does allege that the GE task force activities described by the declaration establish a *prima facie* case of public use of the instant invention (at least claims 1 and 21) in and before 1976, and are therefore prior art under 35 USC 102(b).

Which begs the question, why then did the examiner not reject the instant claims as obvious in view of the Champagne declaration? Because the examiner never thought to do so. The declaration was introduced to illustrate that there was no meaningful distinction in diagnostic practice between internally-generated noise and ingress noise. As noted above, it does not matter whether the unknown signal is of internal or external origin. The source of the unknown signal can be identified in either case by comparing its spectrum to the spectra of known sources. That is what Nickolls teaches. That is what the Champagne declaration teaches. And that, quite simply, is what the instant invention claims.

F. The Examiner Draws the Wrong Conclusions from the Application of KSR

Appellant argues (p. 25, top), "the present method for identifying a source of ingress into a network is not in any way similar to Nickolls's apparatus and method for the detection and treatment of cardiac arrhythmias or to the Champagne declaration's efforts to identify a source of noise in a working gas turbine." The appellant is not correct. In all three cases, an unknown source is identified by comparing its spectrum to the spectra of known sources. One of ordinary skill in the diagnostic art would readily understand that teaching from Nickolls and apply it to the identification of "a source of ingress", as the instant invention claims.

G. Again, Nickolls and the Champagne Declaration are Non-Analogous

Appellant's arguments have been discussed in response to "A" above.

II. Argument for claims 1-4, 6-9, 11-14, 16-19, 21-24, 26-29, 31-34 and 36-39 rejected under 35 U.S.C. 103(a) as being obvious over Nickolls et al.

The examiner cannot find that appellant has added new arguments here.

III. "Nickolls, the Champagne Declaration, Eberhart and 35 U. S. C. § 103" (Brief p. 34-44): The 35 U.S.C § 103 rejections of claims 5, 10, 15, 20, 25, 30, 35 and 40 under 35 U.S.C. 103(a) as being obvious over Nickolls et al. in view of Eberhart et al.

Appellant argues (p. 36), "There Is No Disclosure Or Suggestion To Combine, Or How To Combine, Nor Any Expectation Of Success From Any Combination of Nickolls, the Champagne Declaration and Eberhart To Solve the Specific Problem To Which the Present Invention Is Addressed". The appellant does not appear to have read para. 14 of the rejection:

> "14. Claims 5, 10, 15, 20, 25, 30, 35 and 40 are rejected under 35 U.S.C. 103(a) as being obvious over Nickolls et al. in view of Eberhart et al. (US006516309B1). Nickolls et al. does not teach a particle swarm optimizer. Eberhart et al. teaches a particle swarm optimizer (PSO, Abstract and col. 2 line 47 to col. 3 line 10). Because Eberhart et al. teaches that PSO can improve the efficiency of diagnostic neural networks (col. 1 line 64 to col. 2 line 7), it would have been obvious to one of ordinary skill in the art, at the time of the invention, to add the teachings of Eberhart et al. to those of Nickolls et al."

The examiner discovered after the rejection was mailed that the citation to col. 1 line 64 to col. 2 line 7 is not sufficient. The citation should have been to col. 1 line 62 to col. 2 line 28:

> "Artificial neural networks and evolutionary computational techniques are effective in solving certain classes of problems. For example, artificial neural networks are good at mapping input patterns to output patterns in such applications as diagnostic systems. Moreover, evolutionary computational techniques are good at optimizing an objective in such applications as scheduling systems. In light of the fact that artificial neural networks and evolutionary computational techniques excel at different classes of problems, engineers and scientists have combined artificial neural networks and

evolutionary computational techniques in order to develop hybrid computational tools that are even more effective than either methodology by itself.

For example, in Russ Eberhart, et al., Computational Intelligence PC Tools (1996) a particle swarm technique is described which evolves weights for weighted connections of a neural network. **Use of the particle swarm technique has proven to be highly successful and efficient at accurately evolving neural network weights.** However, the particle swarm technique described in Computational Intelligence PC Tools does not evolve the activation functions used by PEs[5] of the neural network structure nor does the described particle swarm technique evolve aspects of the neural network topology such as the number of PEs used to implement the neural network. **Accordingly, while the described particle swarm technique may successfully train a neural network, a simpler neural network** (i.e. fewer PEs and/or less complex activation functions) **may be obtainable if the particle swarm technique were extended to evolve additional aspects of the neural network**.

A need, therefore, exists for a method and apparatus which evolve neural network weights and other neural network parameters to obtain a simpler neural network than achievable by evolving only neural network weights." (Eberhart et al., US006516309B1, col. 1 line 62 to col. 2 line 28. Emphasis added.)

The appellant does not otherwise introduce any new arguments.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

[5] "Processing elements", Eberhart et al., col. 1 line 18.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Donald L. Champagne/

Primary Examiner, Art Unit 3688

Conferees:

Vincent Millin /VM/
Appeals Practice Specialist

James W. Myhre

/J. W. M./

Supervisory Patent Examiner, Art Unit 3688